

**IN THE CLAIMS**

Please amend the claims as follows:

1. (currently amended) A time-domain communication system for use in an ultrasonic imaging system ~~100~~, the time-domain communication system comprising:

an ultrasonic array ~~112~~ having a plurality of ultrasonic array outputs ~~210~~;

a time-domain multiplexer ~~114~~ having an input connected to each of the plurality of ultrasonic array outputs ~~210~~ and having a multiplexer output ~~230~~, the time-domain multiplexer ~~114~~ continually cycles through each of the plurality of ultrasonic array outputs ~~210~~ at a predetermined frequency connecting each of the plurality of ultrasonic array outputs ~~210~~ to the multiplexer output ~~230~~ for a predetermined amount of time, wherein the plurality of ultrasonic array outputs ~~210~~ comprises a first number of outputs and the multiplexer output ~~230~~ comprises a second number of outputs, the first number of outputs being greater than the second number of outputs;

a de-multiplexer ~~140~~ having an input connected to the multiplexer output ~~230~~, the de-multiplexer having a plurality of de-multiplexer outputs ~~330~~, the de-multiplexer ~~140~~ continually cycles through each of the plurality of de-multiplexer outputs ~~330~~ at the predetermined frequency connecting each of the plurality of de-multiplexer outputs ~~330~~ to the multiplexer output ~~230~~ for the predetermined amount of time, wherein the plurality of de-multiplexer outputs ~~330~~ comprises a third number of outputs, the third number of outputs being greater than the second number of outputs;

a time gain control amplifier ~~150~~ connected to each of the plurality of de-multiplexer outputs ~~330~~ and amplifying each respective signal in each of the plurality of de-multiplexer outputs ~~330~~;

an analog to digital converter ~~160~~ connected to the time gain control amplifier, ~~150~~ wherein each respective signal in each of the plurality of de-multiplexer outputs ~~330~~ is converted to a digital signal at a sample frequency rate; and

a timing reference ~~180~~ connected to the time-domain multiplexer ~~114~~, the de-multiplexer ~~140~~ and the analog to digital converter ~~160~~ for providing a single timing reference to determine at least the predetermined frequency and the sample frequency rate.

2. (currently amended) The system of ~~Claim 1~~ claim 1, wherein the analog to digital converter ~~160~~ is connected to image processing electronics for generating an ultrasonic image.

3. (currently amended) The system of ~~Claim 1~~ claim 1, wherein the ultrasonic array ~~112~~ comprises a plurality of cables bundles wherein each of the plurality of cable bundles includes at least one ultrasonic array output of the plurality of ultrasonic array outputs ~~210~~.

4. (currently amended) The system of ~~Claim 3~~ claim 3, wherein the time-domain multiplexer ~~114~~ comprises a plurality of time-domain multiplexers and the de-multiplexer ~~140~~ comprising a plurality of de-multiplexers ~~340~~, each of the plurality of time-domain multiplexers ~~114~~ having a multiplexer output, ~~230, 340~~ wherein each of the plurality of time domain multiplexers ~~114~~ are connected to a respective one of the plurality of cable bundles and the multiplexer output ~~230, 340~~ of each of the plurality of time-domain multiplexer ~~114~~ being connected to a respective one of the plurality of de-multiplexers ~~140, 320~~.

5. (currently amended) The system of ~~Claim 1~~ claim 1, wherein the predetermined frequency comprises the sample frequency rate times the first number of outputs.

6. (currently amended) A time-domain communication system for use in an ultrasonic imaging system ~~100~~, the communications system comprising:

an ultrasonic probe, ~~110~~ comprising:

an ultrasonic array ~~112~~ having a plurality of ultrasonic array outputs ~~210~~;

and

a time-domain multiplexer ~~114~~ having an input connected to each of the plurality of ultrasonic array outputs ~~210~~ and having a multiplexer output ~~230~~ wherein the time-domain multiplexer ~~114~~ continually cycles through each of the plurality of ultrasonic array outputs ~~210~~ at a predetermined frequency connecting each of the plurality of ultrasonic array outputs ~~210~~ to the multiplexer output ~~230~~ for a predetermined amount of time;

an ultrasonic data processing unit, ~~130~~ comprising:

a de-multiplexer ~~140~~ connected to the multiplexer output ~~230~~, the de-multiplexer ~~140~~ having a plurality of de-multiplexer outputs ~~330~~ wherein the de-multiplexer ~~140~~ continually cycles through each of the plurality of de-multiplexer outputs ~~330~~ at the predetermined frequency connecting each of the plurality of de-multiplexer outputs ~~330~~ to the multiplexer output ~~230~~ for the predetermined amount of time;

a timing reference ~~180~~ connected to the time-domain multiplexer ~~114~~ and the de-multiplexer ~~140~~ for providing a single timing reference to determine at least the predetermined frequency.

7. (currently amended) The system of ~~Claim 6~~ claim 6, wherein the plurality of ultrasonic array outputs ~~210~~ comprises a first number of outputs and the multiplexer output ~~230~~ comprises a second number of outputs, the first number of outputs being greater than the second number of outputs.

8. (currently amended) The system of ~~Claim 7~~ claim 7, wherein the plurality of de-multiplexer outputs ~~330~~ comprises a third number of outputs, the third number of outputs being greater than the second number of outputs.

9. (currently amended) The system of ~~Claim 6~~claim 6, further comprising a time gain control amplifier ~~150~~ connected to each of the plurality of de-multiplexer outputs ~~330~~ and amplifying each respective signal in each of the plurality of de-multiplexer outputs ~~330~~.

10. (currently amended) The system of ~~Claim 9~~claim 9, further comprising an analog to digital converter ~~160~~ connected to the time gain control amplifier ~~160~~ and the timing reference, ~~180~~ wherein each respective signal in each of the plurality of de-multiplexer outputs ~~330~~ is converted to a digital signal at a sample frequency rate.

11. (currently amended) The system of ~~Claim 10~~claim 10, wherein the analog to digital converter ~~160~~ is connected to image processing electronics ~~170~~ for generating an ultrasonic image.

12. (currently amended) The system of ~~Claim 6~~claim 6, wherein the ultrasonic array ~~112~~ comprises a plurality of cables bundles, wherein each of the plurality of cable bundles includes at least one of the plurality of ultrasonic array outputs.

13. (currently amended) The system of ~~Claim 12~~claim 12, wherein the time-domain multiplexer ~~114~~ comprises a plurality of time-domain multiplexers ~~114~~ and the de-multiplexer ~~140~~ comprising a plurality of de-multiplexers ~~320~~, each of the plurality of time-domain multiplexers ~~114~~ having a multiplexer output, ~~230, 340~~ wherein each of the plurality of time domain multiplexers ~~114~~ ~~are~~ is connected to a respective one of the plurality of cable bundles and the multiplexer output ~~230, 340~~ of each of the plurality of time-domain multiplexer ~~114~~ being connected to a respective one of the plurality of de-multiplexers ~~140, 320~~.

14. (currently amended) A method for time-domain communication in an ultrasonic imaging system, the method comprising the steps of:

acquiring ultrasonic data from an ultrasonic array;

transmitting the ultrasonic data via a plurality ultrasonic array outputs to a time-domain multiplexer having an input connected to each of the plurality of ultrasonic array outputs, the plurality of ultrasonic array outputs comprising a first number of outputs;

continually cycling through each of the plurality of ultrasonic array outputs at a predetermined frequency to connect and transmit the ultrasonic data from the plurality of ultrasonic array outputs to at least one multiplexer output for a predetermined amount of time, the at least one multiplexer output having a second number of outputs, wherein the first number of outputs is greater a second number of outputs;

connecting the at least one multiplexer output to a de-multiplexer having a plurality of de-multiplexer outputs, the plurality of de-multiplexer outputs comprising a third number of outputs, wherein the third number of outputs is greater than the second number of outputs;

continually cycling through the plurality of de-multiplexer outputs at the predetermined frequency to connect each of the plurality of de-multiplexer outputs to the at least one multiplexer output and to transmit the ultrasonic data from the multiplexer output to the plurality of de-multiplexer outputs;

amplifying the ultrasonic data in the plurality of de-multiplexer outputs;

converting the amplified ultrasonic data to digital ultrasonic data at a sampling frequency rate; and

creating an ultrasonic image from the digital ultrasonic signal.

15. (currently amended) The method of ~~Claim 14~~ claim 14, wherein the predetermined frequency comprises the sample frequency rate multiplied by the first number of outputs.

16. (currently amended) The method of ~~Claim 14~~claim 14, wherein the predetermined frequency and the sample frequency rate are provided by a timing reference.

17. (currently amended) A method for time-domain communication in an ultrasonic imaging system, the method comprising the steps of:

acquiring ultrasonic data from an ultrasonic array;  
transmitting the ultrasonic data via a plurality ultrasonic array outputs to a time-domain multiplexer having an input connected to each of the plurality of ultrasonic array outputs, wherein the plurality of ultrasonic array outputs comprising a first number of outputs;

continually cycling through each of the plurality of ultrasonic array outputs at a predetermined frequency to connect and transmit the ultrasonic data from each of the plurality of ultrasonic array outputs to at least one multiplexer output for a predetermined amount of time;

connecting the at least one multiplexer output to a de-multiplexer having a plurality of de-multiplexer outputs; and

continually cycling through the plurality of de-multiplexer outputs at the predetermined frequency to connect each of the plurality of de-multiplexer outputs to the at least one multiplexer output and to transmit the ultrasonic data from the multiplexer output to the plurality of de-multiplexer outputs.

18. (currently amended) The method of ~~Claim 17~~claim 17, wherein the at least one multiplexer output has a second number of outputs and the first number of outputs being greater a second number of outputs.

19. (currently amended) The method of ~~Claim 18~~claim 18, wherein the plurality of de-multiplexer outputs comprises a third number of outputs and the third number of outputs is greater than the second number of outputs.

20. (currently amended) The method of ~~Claim 17~~claim 17, further comprising the step of amplifying the ultrasonic data output from the plurality of demultiplexer outputs.

21. (currently amended) The method of ~~Claim 17~~claim 17, further comprising the step of converting the ultrasonic data to digital ultrasonic data at a sampling frequency rate.

22. (currently amended) The method of ~~Claim 18~~claim 18, further comprising the step of creating an ultrasonic image from the digital ultrasonic signal.

23. (currently amended) The method of ~~Claim 18~~claim 18, wherein the predetermined frequency comprises the sampling frequency rate multiplied by the first number of outputs.

24. (currently amended) The method of ~~Claim 18~~claim 18, wherein the predetermined frequency and the sampling frequency rate are provided by a timing reference.